

1

PRACTICE PAPER

[Time Allowed: 90 Minutes]

[Maximum Marks: 35]

General Instructions:

- All Questions are compulsory.
- Each Question carries 1 mark.

Multiple Choice Questions

1. U reacts with ClF_3 to give

- (a) $\text{UF}_6 + \text{ClF}_5$ (b) $\text{UF}_6 + \text{ClF}$ (c) $\text{UF}_4 + \text{ClF}$ (d) $\text{UF}_8 + \text{ClF}$

Ans. (b) $\text{U} + 3\text{ClF}_3 \longrightarrow \text{UF}_6 + 3\text{ClF}$

2. Which of the following has highest bond dissociation enthalpy?

- (a) F_2 (b) Cl_2 (c) Br_2 (d) I_2

Ans. (b) Cl_2 , not F_2 because in F_2 there is repulsion between electrons due to exceptionally small size.

3. Which of the following is non-crystalline or amorphous?

- (a) Diamond (b) Graphite (c) Glass (d) Sodium chloride

Ans. (c)

Or

4. Which of the following does not exhibit Frenkel defect?

- (a) AgBr (b) AgCl (c) KBr (d) ZnS

Ans. (c)

5. Which of the following concentration term relates with vapour pressure of solution directly

- (a) Mole fraction of solute (b) ppm
(c) Mass% (d) Molarity

Ans. (a)

6. Which of the following ions are isoelectronic and isostructural?

- (a) $\text{CO}_3^{2-}, \text{NO}_3^-$ (b) $\text{ClO}_3^-, \text{CO}_3^{2-}$ (c) $\text{SO}_3^{2-}, \text{NO}_3^-$ (d) $\text{ClO}_3^-, \text{SO}_3^{2-}$

Ans. (a) CO_3^{2-} has $6 + 24 + 2 = 32$ electrons, NO_3^- has $7 + 24 + 1 = 32$ electrons. Both are sp^2 hybridised trigonal planar.

Or

7. Which of the following involved in $p\pi-d\pi$ bond?

- (a) C (b) N (c) S (d) B

Ans. (c)

8. Which of the following cannot be used to oxidise primary alcohol to aldehyde?

- (a) CrO_3 in anhydrous medium (b) KMnO_4 in acidic medium
(c) PCC (d) $\text{Cu}/573\text{ K}$

Ans. (b)

9. SO_2 reacts with O_2 in presence of catalyst at 770 K and at high pressure to form SO_3 , the homogeneous catalyst used is

- (a) NO (b) NO_2 (c) V_2O_5 (d) Pt

Ans. (a) NO (g) is homogeneous catalyst.

Or

10. The oxidation state of 'S' in $\text{H}_2\text{S}_2\text{O}_8$ is

- (a) 4 (b) 6 (c) 8 (d) 5

Ans. (b) \therefore it has peroxide linkage

11. The IUPAC name of $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}_2-\text{Br}$

- (a) Allyl bromide (b) 3-Bromo propene
(c) 1-Bromo prop-2-ene (d) 4-Bromo but-1-ene

Ans. (d) $\begin{matrix} 1 & 2 & 3 & 4 \\ \text{CH}_2 & =\text{CH} & -\text{CH}_2 & -\text{CH}_2\text{Br} \end{matrix}$ 4-Bromo but-1-ene

12. Which of the following terms are correct about RNA and DNA?

- (a) Proteins (b) Dinucleotides (c) Nucleic acid (d) Amylopectin

Ans. (c)

Or

13. Which of the following bases is not present in DNA?

- (a) Adenine (b) Thymine (c) Cytosine (d) Uracil

Ans. (d)

14. A given metal crystallises and with a cubic structure having edge length of 361 pm. If there are four metal atoms in one unit cell. What is the radius of unit cell?

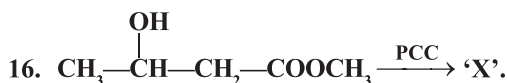
- (a) 127 pm (b) 80 pm (c) 108 pm (d) 40 pm

Ans. (a) $4r = \sqrt{2} a \Rightarrow 4r = 1.414 \times 361$
 $\Rightarrow r = \frac{510.454}{4} = 127.61\text{ pm.}$

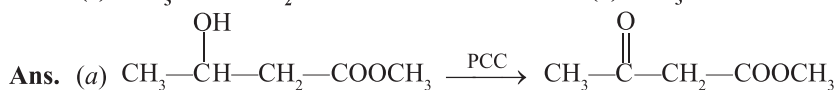
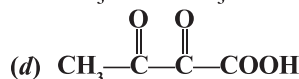
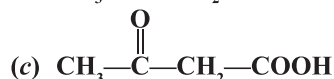
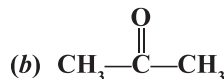
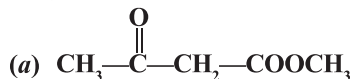
15. The product formed when tert. butyl alcohol is heated with $\text{Cu}/573\text{ K}$:

- (a) 2-methyl butene (b) 2-methyl propene (c) Acetone (d) Butan-2-one

Ans. (b) $\begin{matrix} \text{CH}_3 \\ | \\ \text{CH}_3-\text{C}-\text{CH}_3 \\ | \\ \text{OH} \end{matrix} \xrightarrow[573\text{ K}]{\text{Cu}} \begin{matrix} \text{CH}_3 \\ | \\ \text{CH}_3-\text{C}=\text{CH}_2 \\ \text{2-methyl propene} \end{matrix} + \text{H}_2\text{O}$



'X' is:



17. The IUPAC name of $\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{OH}$ is

- (a) 1-Phenyl ethanol (b) 2-phenyl ethanol (c) 2-Benzyl ethanol (d) None of these

Ans. (b)

Or

18. Which of the following will give Iodoform test with I_2 and NaOH ?

- (a) 1-Phenyl ethanol (b) Acetophenone (c) Acetone (d) All of these

Ans. (d)

19. Density of 3 M NaCl solution is 1.25 g cm^{-3} . The molality of solution is

- (a) 2.8 m (b) 0.28 m (c) 1.28 m (d) 3.85 m

Ans. (a)
$$m = \frac{M \times 1000}{1000 \times d - M \times \text{M.Wt}} = \frac{3 \times 1000}{1000 \times 1.25 - 3 \times 58.5}$$

$$= \frac{3000}{1250 - 175.5} = \frac{3000}{1074.5} = 2.8 \text{ m}$$

20. In a compound element 'A' crystallises in *hcp* lattice, element M occupies 2/3rd of tetrahedral voids. The formula of compound is

- (a) M_4A_3 (b) MA (c) M_4A (d) M_2A_3

Ans. (a) $\text{M}_{2 \times \frac{2}{3}}\text{A} \Rightarrow \text{M}_{\frac{4}{3}}\text{A} \Rightarrow \text{M}_4\text{A}_3$.

Assertion-Reasoning Type MCQs

In the following questions (Q. No. 21 to 30), a statement of assertion is followed by a statement of a reason is given. Choose the correct answer out of the following choices.

- (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
 (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
 (c) Assertion is correct statement but reason is wrong statement.
 (d) Assertion is wrong statement but reason is correct statement.

21. Assertion: Phenol reacts with CHCl_3 and KOH at 340K to form *o*-hydroxy benzaldehyde.

Reason: Benzaldehyde reacts with CH_3CHO in presence of alkali, followed by heating in presence of H^+ to give cinnamaldehyde.

Ans. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Or

22. Assertion: Grignard reagent react with aldehydes and ketones to form alcohols.

Reason: Alcohols have acidic hydrogen.

Ans. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

23. Assertion: XeF_2 is isostructural with I_3^- .

Reason: Both have 2 bonded pair, 3 lone pair of electrons, linear shape.

Ans. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

Or

24. Assertion: SO_2 acts as both oxidising as well as reducing agent.

Reason: In SO_2 , 'S' has highest oxidation state.

Ans. (c) Assertion is correct statement but reason is wrong statement.

25. Assertion: Albumin is globular protein.

Reason: Globular proteins are insoluble in water.

Ans. (c) Assertion is correct statement but reason is wrong statement.

26. Assertion: Nitrogen is less reactive than phosphorus.

Reason: Ionisation energy of Nitrogen is higher than phosphorus.

Ans. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

27. Assertion: Packing efficiency of *hcp* and *ccp* is 74%.

Reason: In *bcc*, $4r = \sqrt{2} a$.

Ans. (c) Assertion is correct statement but reason is wrong statement.

28. Assertion: Keratin has β -pleated structure.

Reason: Fibrous proteins are insoluble in water.

Ans. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

29. Assertion: Corona vaccines are RNA based.

Reason: RNA contains ribose sugar.

Ans. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

30. Assertion: In acidic pH, glycine exist as $\text{H}_3\text{N}^+\text{—CH}_2\text{—COOH}$.

Reason: In proteins, amino acids are linked through peptide bonds.

Ans. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Case-Based MCQs

I. Read the passage given below and answer the following questions:

The lowering of vapour pressure of a solution causes lowering of freezing point of solution as compared to pure solvent. At freezing point, the solid phase is in dynamic equilibrium with liquid phase. Freezing point is a temperature at which vapour pressure in solution phase is equal to that of solid phase. Antifreeze like ethylene glycol are added in radiators of vehicles especially in cold countries. Common salt is sprinkled over roads so as to clear snow at hill stations. Depression in freezing point is directly proportional to molality of solution.

The following questions are multiple choice questions. Choose the most appropriate answer:

31. K_f (Cryoscopic constant) is equal to ΔT_f when 'molality is equal to [in case of non-electrolyte]'
 (a) 0 (b) 1 (c) 2 (d) 1/2

Ans. (b) $\Delta T_f = K_f \times m$

\Rightarrow when $m = 1, \Delta T_f = K_f$

32. K_f is directly proportional to

- (a) Freezing point in kelvin (b) Square of freezing point in kelvin
 (c) Cube of freezing point (d) Square root of freezing point

Ans. (b) $\therefore K_f = \frac{T_f^2 \times R \times M_{\text{solvent}}}{\Delta H_{\text{fusion}} \times 1000}$

33. On dissolving 0.5 g a non-volatile solute which is non-ionic to 39 g of benzene, its vapour pressure decreases from 650 mm Hg to 600 mm Hg. What will be depression in freezing point? [Molar mass of $C_6H_6 = 78 \text{ g mol}^{-1}$, $K_f = 5.12 \text{ K kg mol}^{-1}$]

- (a) 1.03 K (b) 2.06 K (c) 0.52 K (d) 3.09 K

Ans. (a) $\frac{P_A^0 - P_A}{P_A^0} = x_B \Rightarrow \frac{650 - 640}{640} = \frac{W_B}{M_B} \times \frac{M_A}{W_A}$

[For dilute solution $\frac{W_B}{M_B} \ll \ll \frac{W_A}{M_A}$]

$\Rightarrow \frac{10}{640} = \frac{0.5}{M_B} \times \frac{78}{39}$
 $M_B = 64 \text{ g mol}^{-1}$

$\Rightarrow \Delta T_f = K_f \times \frac{W_B}{M_B} \times \frac{1000}{W_A} = 5.12 \times \frac{0.5}{64} \times \frac{1000}{39} = 1.03 \text{ K}$

34. Calculate the value of K_f for H_2O if $\Delta_{\text{fus}} H^\circ = 6.0 \text{ kJ mol}^{-1}$, freezing point is 273 K, $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$, molar mass of water = 18 g mol^{-1}

- (a) $0.52 \text{ K kg mol}^{-1}$ (b) $1.86 \text{ K kg mol}^{-1}$
 (c) $1.86 \text{ K kg}^{-1} \text{ mol}^{-1}$ (d) None of these

Ans. (b)
$$K_f = \frac{R \times M \times T_f^2}{1000 \times \Delta_{fusion} H^\circ} = \frac{8.314 \times 18 \times (273)^2}{1000 \times 6 \times 1000 \text{ J}} = \frac{11.153}{6.0}$$

$$= 1.858 \text{ K kg mol}^{-1} = 1.86 \text{ K kg mol}^{-1}$$

Or

35. Urea forms an ideal solution in water. Determine the vapour pressure of 1 molal aqueous solution of urea at 40° C.

[Vapour pressure of pure water at 40° C = 55.3 mm of Hg, M_B of urea = 60 g mol⁻¹]

- (a) 27.16 mm (b) 50.00 mm (c) 54.32 mm (d) 48.00 mm

Ans. (c)
$$\frac{p_A^0 - p_A}{p_A^0} = x_B = \frac{m}{m + \frac{1000}{M_A}}$$

where 'm' is molality, M_A is molar mass of water

$$1 - \frac{p_A}{p_A^0} = \frac{1}{1 + \frac{1000}{18}} = \frac{18}{1018}$$

$$\Rightarrow 1 - \frac{18}{1018} = \frac{p_A}{p_A^0}$$

$$\Rightarrow p_A = 55.3 \times \frac{1000}{1018}$$

$$p_A = 54.32 \text{ mm of Hg}$$

II. Read the passage given below and answer the following questions:

Haloarenes are less reactive than haloalkanes towards nucleophilic substitution reactions. Electron withdrawing groups increase the rate of nucleophilic substitution reactions of haloarenes and electron releasing groups decrease the rate of nucleophilic substitution reactions. Haloarenes undergo electrophilic substitution reactions at *o* and *p*-position in spite of halogens are electron withdrawing due to -I effect. Haloarenes undergo halogenation, Friedel Crafts alkylation, acylation, sulphonation and nitration. Chlorobenzene reacts with chloral in presence of conc. H₂SO₄ to form DDT which is insecticide, non-biodegradable, causes water pollution, therefore, banned in U.S.A.

In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
- (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
- (c) Assertion is correct statement but reason is wrong statement.
- (d) Assertion is wrong statement but reason is correct statement.

36. Assertion: Chlorobenzene reacts with NaOH at 623 K and 300 atm to form phenol by S_N2 mechanism.

Reason: Chlorobenzene undergo nucleophilic substitution reaction more easily than *p*-nitro chlorobenzene.

Ans. (c) Assertion is correct statement but reason is wrong statement.

37. Assertion : Chlorobenzene reacts with conc. HNO_3 and conc. H_2SO_4 to form *m*-nitro chlorobenzene.

Reason: NO_2 group is electron withdrawing, hence, *m*-directing.

Ans. (d) Assertion is wrong statement but reason is correct statement.

38. Assertion : 2, 4, 6-trinitro chlorobenzene reacts with H_2O on heating to give picric acid.

Reason: Three NO_2 groups increase the rate of nucleophilic substitution reaction.

Ans. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

39. Assertion : Chlorobenzene reacts with Cl_2 and $FeCl_3$ to give *o* and *p*-dichlorobenzene.

Reason: *p*-dichlorobenzene has higher melting point than *o*-dichlorobenzene.

Ans. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Or

40. Assertion : IUPAC name of DDT is 1,1,1-trichloro-2,2-bis (*p*-chlorophenyl) ethane.

Reason: Chloral is 2,2,2-trichloro ethanal.

Ans. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

III. Read the given passage and answer the question that follow:

In 1962, Neil Bartlet prepared a complex compound by reacting molecular oxygen and PtF_6 . Then, he carried out the reaction between Xe and PtF_6 and obtained a red coloured compound. Noble gases have low boiling point. They have least reactivity, highest ionisation enthalpy and positive electron gain enthalpy. Xe shows +2, +4, +6 oxidation state in XeF_2 , XeF_4 and XeF_6 respectively. XeF_4 reacts violently with water to give XeO_3 . The geometries of compounds of Xenon can be deduced on the basis of VSEPR Theory.

In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices:

(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

(c) Assertion is correct statement but reason is wrong statement.

(d) Assertion is wrong statement but reason is correct statement.

41. Assertion: The red compound is $\text{Xe}^+[\text{PtF}_6]^-$.

Reason: Xe has higher ionisation enthalpy as O_2 .

Ans. (c) Assertion is correct statement but reason is wrong statement.

42. Assertion: XeO_3 is planar molecule.

Reason: XeO_3 is sp^3 hybridised and has one lone pair.

Ans. (d) Assertion is wrong statement but reason is correct statement.

43. Assertion: Xe can easily form compound among noble gases.

Reason: Xe has low ionisation enthalpy and high polarising power.

Ans. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

44. Assertion: F_2 is more reactive than Cl_2 and O_2 .

Reason: F_2 has lower bond dissociation enthalpy than Cl_2 and O_2 .

Ans. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

Or

45. Assertion: XeF_2 on hydrolysis gives Xe, HF and O_2 .

Reason: Hydrolysis of XeF_2 is a redox reaction, H_2O acts as reducing agent.

Ans. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

2

PRACTICE PAPER

[Time Allowed: 90 Minutes]

[Maximum Marks: 35]

General Instructions:

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Multiple Choice Questions

1. The size of mango shrinks to a much smaller size when kept in concentrated salt solution. Which of the following phenomena can explain this process?


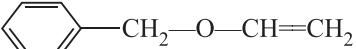
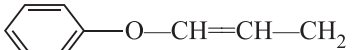
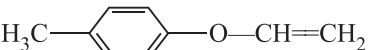
- (a) Dialysis (b) Reverse osmosis
(c) Osmosis (d) Diffusion

Or

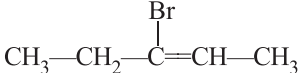
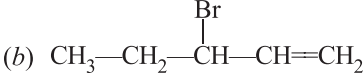
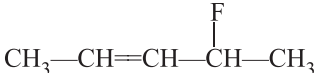

2. K_b depends upon

- (a) Directly proportional to Molar mass of solvent
(b) Directly proportional to Boiling point of solvent
(c) Inversely proportional to $\Delta_{\text{vap}}H$ of solvent
(d) All of these

3. An organic compound 'A' ($C_9H_{10}O$) when treated with conc. HI undergoes cleavage to yield compound 'B' and 'C'. 'B' gives yellow ppt. with $AgNO_3(aq)$ solution where as 'C' tautomerises to give 'D'. 'D' gives positive iodoform test. A could be

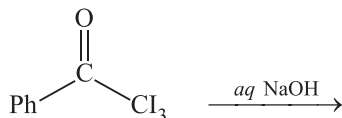
- (a)  (b) 
(c)  (d) 

4. The major product obtained by elimination reaction of 3-Bromo-2-fluoro pentane with $KOH(alc)$ is

- (a)  (b) 
(c)  (d) 

5. Which of the following is not an essential amino acid?
 (a) Tyrosine (b) Valine (c) Leucine (d) Lysine
6. A diatomic molecule X_2 has *bcc* structure with cell edge of 300 pm, the density of molecule is 6.47 g cm^{-3} . The number of molecules present in 200 g of X_2 is $[N_A = 6.02 \times 10^{23} \text{ mol}^{-1}]$
 (a) $4 N_A$ (b) $2 N_A$ (c) $40 N_A$ (d) $8 N_A$

7. The major product of the following reaction is



- (a) $\text{CHI}_3 + \text{Ph}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$ (b) $\text{Ph}-\overset{\text{O}}{\parallel}{\text{C}}-\text{ONa} + \text{CHI}_3$
 (c) $\text{Ph}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CHBr}_2 + \text{NaBr}$ (d) $\text{C}_6\text{H}_6 + \text{Cl}_3\text{COONa}$
8. The osmotic pressure of a solution is 7.8 bar at 37°C . What is elevation in boiling point of solution? $[R = 0.083 \text{ L bar K}^{-1} \text{ mol}^{-1}]$
 (a) 0.157 (b) 0.314 (c) 0.45 (d) 0.50
9. The sodium salt of which oxo acids are formed by Cl_2 with cold NaOH and hot and conc. NaOH?
 (a) $\text{HOCl}, \text{HOCl}_2$ (b) $\text{HOCl}, \text{HClO}_3$
 (c) $\text{HClO}_2, \text{HClO}_3$ (d) $\text{HOCl}, \text{HClO}_4$
10. Which is strongest oxidising agent?
 (a) O_2 (b) O_3 (c) F_2 (d) Cl_2
11. I_2 reacts with conc. HNO_3 to give
 (a) HIO_2 (b) HIO_3 (c) HIO_4 (d) HI

Or

12. When Cl_2 reacts with hot and conc. NaOH, the oxidation number of chlorine changes from
 (a) zero to +1 and zero to +5 (b) 0 to -1 and 0 to +5
 (c) zero to -1 and zero to +3 (d) 0 to +1 and 0 to -3
13. The protein present in egg is
 (a) albumin (b) Casein (c) Both (a) and (b) (d) None of these

Or

14. ADP and ATP differ in number of
 (a) phosphate units (b) ribose units (c) adenine units (d) nitrogen atoms

15. Which of the following is sweetest sugar?
(a) Glucose (b) Fructose (c) Galactose (d) All of these

Or

16. Glucose, when reduced with HI and red phosphorus gives
(a) *n*-hexane (b) *n*-heptane (c) *n*-pentane (d) *n*-octane
17. People taking lot of common salt experience water retention tissue cells and intercellular space which leads to puffiness or swelling called
(a) Anoxia (b) Edema (c) Bend (d) None of these

Or

18. Which has the highest freezing point?
(a) 1.0 M Glucose (b) 2.0 M Glucose (c) 3.0 M Glucose (d) 5.0 M Glucose
19. An hydrocarbon 'X' C_5H_{10} gives one monochloro derivative on photo-chlorination 'X' is
(a) 1-Pentene (b) 2-Pentene (c) Cyclopentane (d) 2-methyl-1-butene
20. C—X bond is strongest in
(a) CH_3F (b) CH_3Cl (c) CH_3Br (d) CH_3I

Assertion-Reasoning Type MCQs

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(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.

21. **Assertion:** The shape of XeF_4 is tetrahedral.

Reason: It has four bonded pair and 2 lone pair of electrons.

Or

22. **Assertion:** Sulphur belongs to same group in the periodic table as oxygen.

Reason: S_2 has properties analogous to O_2 .

23. **Assertion:** A solution in which no more amount of solute can be dissolved is saturated solution.

Reason: The minimum amount of solute dissolved in given amount of solvent is called solubility.

24. **Assertion:** I_2 is more soluble in KI solution than water.

Reason: It is due to formation of KI_3 .

25. **Assertion:** CH_3F has less dipole moment than CH_3Cl .

Reason: CH_2Cl_2 has highest dipole moment among CH_2Cl_2 , CHCl_3 and CCl_4 .

26. **Assertion:** IF_5 has square pyramidal shape.

Reason: It has sp^3d^2 hybridisation and one lone pair.

27. **Assertion:** All intravenous injections must be isotonic with body fluids.

Reason: Isotonic solutions have different osmotic pressure.

Or

28. **Assertion:** If blood cells are placed in saline water, it will shrink.

Reason: Saline water is on solution side hypertonic solution, therefore, cell fluid will come out.

29. **Assertion:** RNA and DNA differ in sugar and pyrimidine.

Reason: RNA is of three types, *m*-RNA, *t*-RNA and *r*-RNA.

30. **Assertion:** Amino acids have higher melting points than α -haloacids.

Reason: Amino acids exist as zwitter ion due to which they form internal salt with strong forces of attraction.

Case-Based MCQs

I. Read the passage given below and answer the following questions:

Alcohols are the hydroxy derivatives of aliphatic hydrocarbons where as phenols are hydroxy derivatives of arenes in which —OH group is directly linked with benzene ring. These are used in daily life. Ordinary spirit is used as antiseptic for cleaning wounds as well as for polishing furniture. The sugar we eat, cotton (cellulose) we wear, the paper (cellulose) on which we write all are made up compounds containing alcohol. Alcohol is present in wine, cough syrups and tonics. Phenol is used as antiseptic and disinfectant and for preparation of medicines like Aspirin, Iodex etc.

Aspirin is prepared by reacting salicylic acid with Acetic anhydride in presence of NaOH. It is used as analgesic, antipyretic and prevents heart attack. Iodex, is methyl salicylate, used in muscle pain reliever.

The following questions are multiple choice questions. Choose the most appropriate answer:

31. Ethyl alcohol reacts with conc. H_2SO_4 at 413 K to give

(a) $\text{CH}_2 = \text{CH}_2$ (b) $\text{C}_2\text{H}_5\text{HSO}_4$ (c) $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$ (d) $(\text{C}_2\text{H}_5)_2\text{SO}_4$

32. Salicylic acid reacts with acetic anhydride to give

(a) Methyl salicylate (b) Acetyl salicylate (c) Aspirin (d) All of these

33. Which of the following reacts with NaHCO_3 ?
(a) Phenol (b) 2, 4-Dinitrophenol (c) Picric acid (d) Ethanol
34. Salicylic acid reacts with CH_3OH in presence of conc. H_2SO_4 to give
(a) Methyl salicylate (b) Ethyl salicylate
(c) Phenyl salicylate (d) Salol

Or

35. Which of the following reacts with $\text{C}_2\text{H}_5\text{MgCl}$ followed by hydrolysis give Propan-1-ol?
(a) Methanal (b) Ethanal (c) Propanal (d) Acetone

II. Read the passage given below and answer the following questions:

Solids have definite mass, volume and shape. In amorphous solids there is short range order where as crystalline solids have long range order. Solids can be classified as molecular, ionic, covalent and metallic solids. Crystalline solids can be classified into seven crystal systems which have 14 Bravais lattices. Cubic crystals are of three types simple cubic, *fcc* and *bcc*. Close packing of particles results in highly efficient lattices *hcp* and *ccp* or *fccp* having packing efficiency 74%. Simple cubic packing has 52% efficiency and *bccp* has 68% packing efficiency.

In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.
36. **Assertion:** Simple cubic packing has least efficiency.
Reason: Simple cubic packing has coordination number 4 in 2D and 6 in 3D.
37. **Assertion:** Dry ice is covalent solid.
Reason: Graphite is covalent solid.
38. **Assertion:** Crystalline solids are anisotropic.
Reason: Amorphous solids have sharp melting point.
39. **Assertion:** The rank of *bcc* element is 2.
Reason: Coordination number of Central atom in *bcc* is 8.

Or

40. **Assertion:** Free space in *fccp* is 26%.
Reason: Rank of *fcc* unit cell is 4.

III. Read the passage given below and answer the following questions:

Group 13 to Group 18 elements are called *p*-block elements because *p*-orbitals are progressively filled. Group 16 elements are called **chalcogens**, Group 17 elements are called **halogens** and Groups 18 elements are called **noble gases**. The general electronic configuration is $ns^2 np^1$ to 6 . They consist of metals, non-metals as well as metalloids. They consist of solids, liquids as well as gases. They show variable oxidation states.

The following questions are multiple choice questions. Choose the most appropriate answer:

41. Which of the following is not paramagnetic?
(a) O_2 (b) O_3 (c) KO_2 (d) S_2 in vapour state
42. Which of the following is temporary bleaching agent?
(a) O_3 (b) H_2O_2 (c) Cl_2 (d) SO_2
43. Which of the following is strongest reducing agent?
(a) H_2O (b) H_2S (c) H_2Se (d) H_2Te
44. When H_2S gas is passed through aqueous solution of lead acetate
(a) White ppt. of PbS (b) Black ppt. of PbS
(c) No reaction takes place (d) Yellow ppt. of PbS
- Or**
45. Which of the following does not have 'S' in +6 oxidation state?
(a) H_2SO_4 (b) H_2SO_5
(c) H_2SO_3 (d) $H_2S_2O_8$

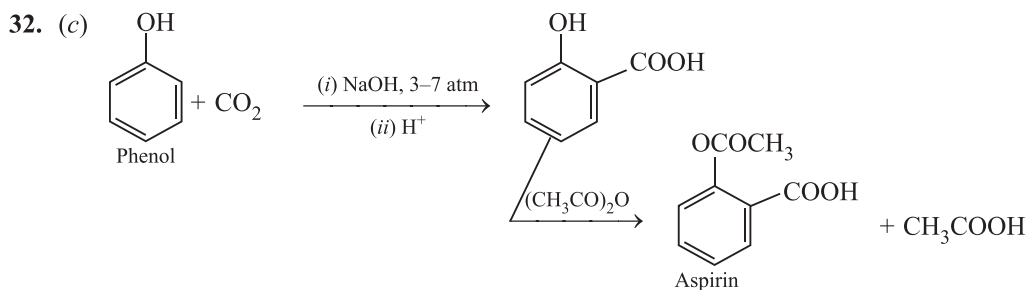
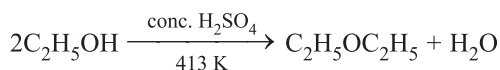
ANSWERS

1. (c) **Or** 2. (d) 3. (b) 4. (d) 5. (a)
6. (a) 7. (b) 8. (a) 9. (b) 10. (c)
11. (b) **Or** 12. (b) 13. (a) **Or** 14. (a) 15. (b) **Or**
16. (a) 17. (b) **Or** 18. (a) 19. (c) 20. (a)
21. (d) Assertion is wrong statement but reason is correct statement
- Or**
22. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
23. (c) Assertion is correct statement but reason is wrong statement.
24. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

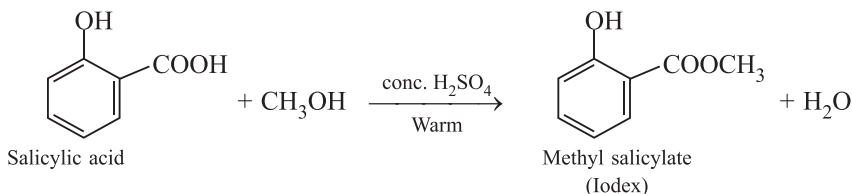
25. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
26. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
27. (c) Assertion is correct statement but reason is wrong statement.

Or

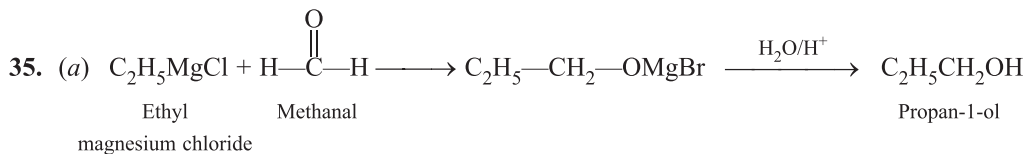
28. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
29. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
30. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
31. (c) Diethyl ether is formed.



33. (c) Picric acid is more acidic than phenol like carboxylic acid, therefore, reacts with NaHCO₃.
34. (a) Methyl salicylate is formed.



Or



36. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
37. (d) Assertion is wrong statement but reason is correct statement.
38. (c) Assertion is correct statement but reason is wrong statement.
39. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Or

40. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
41. (b) O_3 is diamagnetic due to absence of unpaired electrons.
42. (d) SO_2 because it bleaches by reduction and is temporary bleaching agent.
43. (d) H_2Te due to low bond dissociation enthalpy due to longer bond length.
44. (b) $Pb(COOCH_3)_2(aq) + H_2S(g) \longrightarrow PbS(s) + 2CH_3COOH(aq)$

Or

45. (c) It has 'S' in +4 oxidation state.

3

PRACTICE PAPER

[Time Allowed: 90 Minutes]

[Maximum Marks: 35]

General Instructions:

- All Questions are compulsory.
- Each Question carries 1 mark.

Multiple Choice Questions

1. The fraction of total volume occupied by all the atoms in simple cubic is

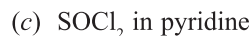
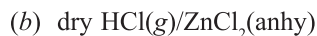
(a) $\frac{\pi}{4}$

(b) $\frac{\pi}{6}$

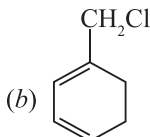
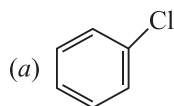
(c) $\frac{\pi}{3\sqrt{2}}$

(d) $\frac{\pi}{2\sqrt{2}}$

2. The best method to prepare alkyl halide from alcohol is



3. Which one is most reactive towards $\text{S}_{\text{N}}1$ mechanism?



4. $\alpha\text{-D(+)}$ glucose and $\beta\text{-D(+)}$ glucose are

(a) Epimers

(b) Enantiomers

(c) Anomers

(d) Diastereomers

5. Deacon's process is used for manufacture of

(a) HCl

(b) Cl_2

(c) ClO_2

(d) None of these

6. HNO_3 is prepared by

(a) Ostwald process

(b) Contact process

(c) Haber's process

(d) Oxo Process

7. Which of the following is correct order of increasing electron gain enthalpy?
(a) $O < Te < Se < S$ (b) $O < S < Se < Te$ (c) $O > S > Se > Te$ (d) $S < Te < Se < O$

Or

8. Among the following which is strongest oxidising agent.
(a) Br_2 (b) I_2 (c) Cl_2 (d) F_2
9. Mono chlorination of toluene in presence of sun light gives
(a) Benzyl chloride (b) *p*-dichloro benzene
(c) *o*-dichloro benzene (d) All of these
10. Number of asymmetric (chiral) carbon in 2, 3-dichloro butane are
(a) 1 (b) 2 (c) 3 (d) None
11. An element has *bcc* structure with atomic mass 100 g/mol and cell edge 400 pm. The density of element is
(a) 6 g cm^{-3} (b) 7 g cm^{-3} (c) 5.188 g cm^{-3} (d) 8 g cm^{-3}

Or

12. In which pair most efficient packing is present?
(a) *hcp* and *bcc*
(b) *hcp* and *ccp*
(c) *bcc* and *ccp*
(d) *bcc* and simple cubic cell
13. The crystal lattice of graphite is
(a) Cubic (b) Hexagonal (c) Octahedral (d) Monoclinic

Or

14. Which kind of defects are introduced by doping?
(a) Dislocation defect (b) Schottky defect (c) Frenkel defects (d) Electronic defects
15. Gold has *fcc* Structure with edge length 400 pm. The radius of gold atom is
(a) 288 pm (b) 144 pm (c) 176 pm (d) 300 pm
16. The existence of a substance in more than one solid modification is known as
(a) Isomorphism (b) Polymorphism (c) Amorphism (d) None of these
17. Which of the following does not have linear shaped?
(a) XeF_2 (b) I_3^- (c) ClF_3 (d) IBr_2^-

Or

18. Affinity for hydrogen decreases in the group from fluorine to iodine. Which of the halogen acids should have highest bond dissociation enthalpy?
(a) HF (b) HCl (c) HBr (d) HI
19. Which of the following is acidic amino acid?
(a) Alanine (b) Glycine (c) Glutamic acid (d) Arginine

Or

20. DNA and RNA differ in

- (a) Sugar (b) Purines (c) Pyrimidines (d) Both (a) and (c)

Assertion-Reasoning Type MCQs

In the following questions (Q. No. 21 to 30), a statement of assertion is followed by a statement of a reason is given. Choose the correct answer out of the following choices.

- (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.

21. **Assertion:** Haloarenes are less reactive than chloro alkanes towards nucleophilic substitution reaction.

Reason: It is due partial double bond character between C—Cl bond due to resonance.

Or

22. **Assertion:** Nitration of chlorobenzene leads to the formation of *m*-nitrochlorobenzene

Reason: —NO₂ group is a *m*-directing group.

23. **Assertion:** Fluoro benzene can be prepared by heating C₆H₅N₂⁺BF₄⁻.

Reason: Its is Balz Schiemann reaction.

Or

24. **Assertion:** In monohaloarenes, further electrophilic substitution occurs at ortho and para positions.

Reason: Halogen atom is a ring deactivator.

25. **Assertion:** ClF₃ is more reactive and powerful oxidising agent than F₂.

Reason: ClF on hydrolysis give HOCl and HF.

26. **Assertion:** SO₂ acts as both oxidising and reducing agent.

Reason: SO₂ turns acidified potassium dichromate solution green.

27. **Assertion:** Glucon-D contains dextro rotatory glucose.

Reason: Fructose is keto hexose and functional isomer of glucose.

28. **Assertion:** Ideal solution $\Delta H_{\text{mix}} = 0$.

Reason: Ideal solution A-B interaction are less than A-A and B-B.

29. **Assertion:** Globular proteins are soluble in water.

Reason: Hard boiled egg is an example of denatured protein.

30. **Assertion:** RNA and DNA both are chiral molecules.

Reason: RNA has double helical structure.

Case-Based MCQs

I. Read the passage given below and answer the following questions:

There are many phenomenon which we observe in nature or at home. For example, raw mangoes shrink when pickled in brine, wilted flowers revive in fresh water, etc. The substances are bound by membranes. The process of flow of solvents is called osmosis. The pressure that must be applied on solution side which stops osmosis is called osmotic pressure. Osmotic pressure is directly proportional to molarity of solution at a given temperature. If we take excess of common salt, our blood pressure will increase.

In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
- (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
- (c) Assertion is correct statement but reason is wrong statement.
- (d) Assertion is wrong statement but reason is correct statement.

31. **Assertion:** 1 M NaCl have higher osmotic pressure than 1 M urea.

Reason: NaCl is non-electrolyte, urea is electrolyte.

32. **Assertion:** Sea water can be converted into potable water by Reverse osmosis.

Reason: If we apply pressure greater than osmotic pressure on solution side, reverse osmosis will take place.

33. **Assertion:** RBC in animal cells are isotonic with 0.9% NaCl solution.

Reason: RBC when placed in 1% NaCl solution, cell will shrink.

34. **Assertion:** Synthetic membrane is made up of cellulose nitrate.

Reason: Animal membrane are natural membrane.

Or

35. **Assertion:** Diabetic patients are most likely to have high blood pressure.

Reason: They have high blood glucose level which increases blood pressure.

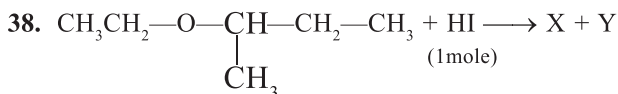
II. Read the passage given below and answer the following questions:

Epoxides or olefin oxides are also called cyclic ethers. Their structure contains a three membered ring made of two carbon and oxygen atom. They are heterocyclic compounds, highly reactive, e.g. they undergo reactions that are accompanied by ring opening and closing followed by attachment of the nucleophile. These reactions are used in production of hypertension medications, antibiotics and steroids. H_2O_2 is most common oxidants in olefin epoxidation process, H_2O_2 is rarely used because it poorly dissolves in hydrocarbons. The course of the process is catalysed by metal oxides of group 4–6, e.g. Ti, V, Mo, W. The well known is propene epoxidation reaction. Propene oxide production in the world is close to 6 million tons per year.

(Reference: *International Journal of Molecular Sciences, (MDPI) P.3. Ins J. Mol. Sc. 2020-21, 5443.*)

The following questions are multiple choice questions. Choose the most appropriate answer:

36. Ethylene oxide on reaction with 2 mole of HI gives
 (a) $\text{ICH}_2\text{—CH}_2\text{OH}$ (b) $\text{ICH}_2\text{—CH}_2\text{I}$
 (c) $\text{CH}_2=\text{CH}_2$ (d) None of these
37. Which of the following is used to prepare unsymmetrical ether?
 (a) Wurtz reaction (b) Williamson synthesis
 (c) Fittig reaction (d) Kolbe's reaction



X and 'Y' are

- (a) $\text{CH}_3\text{CH}_2\text{I} + \text{CH}_3\text{—}\underset{\text{OH}}{\text{CH}}\text{—CH}_2\text{—CH}_3$ (b) $\text{CH}_3\text{CH}_2\text{OH} + \text{CH}_3\text{—}\underset{\text{I}}{\text{CH}}\text{—CH}_2\text{—CH}_3$
 (c) $\text{CH}_3\text{CH}_2\text{I} + \text{CH}_3\text{—}\underset{\text{I}}{\text{CH}}\text{—CH}_2\text{—CH}_3$ (d) None of these
39. The number of isomers of $\text{C}_2\text{H}_4\text{O}$ are
 (a) 2 (b) 1 (c) 3 (d) 4

Or

40. The total number of isomers of $\text{C}_4\text{H}_{10}\text{O}$ are
 (a) 4 (b) 7 (c) 6 (d) 8

III. Read the passage given below and answer the following questions.

p-block elements (Group 13 to 18) consists of metals, non-metals, metalloids. Reactivity of non-metals decreases down the group in group 17. They show variable oxidation state which differ by 2 whereas *d*-block elements (Group 3 to 12), oxidation state differ by 1. In *p*-block elements, heavier elements show lower oxidation states more easily than higher oxidation state whereas in *d*-block elements, heavier elements show higher oxidation states more easily. Gold, silver and platinum are precious metals. Titanium and zirconium are also useful metals. Extraction of metals depends upon the nature of impurities present in the ores of metal. Refining of metals depends upon the properties of metals and impurities present in them.

In these questions, a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

- (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
 (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
 (c) Assertion is correct statement but reason is wrong statement.
 (d) Assertion is wrong statement but reason is correct statement.

41. **Assertion:** F_2 can react with aq. solution of NaCl, NaBr, NaI to displace Cl_2 , Br_2 , I_2 respectively.
Reason: Order of reactivity is $F_2 > Cl_2 > Br_2 > I_2$.
42. **Assertion :** F_2 reacts with H_2O to form HF and O_2 .
Reason: F_2 acts as reducing agent and H_2O is oxidising agent.
43. **Assertion :** Cl_2 is permanent bleaching agent.
Reason: It bleaches by oxidation.
44. **Assertion :** SF_4 has tetrahedral shape.
Reason: It has 4 bonded pair and 1 lone pair.
- Or**
45. **Assertion :** XeF_2 is linear molecule.
Reason: Xe is 'sp' hybridised in XeF_2 .

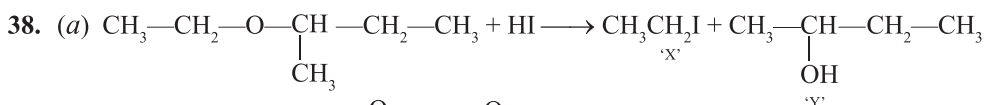
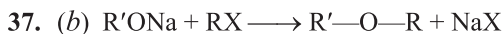
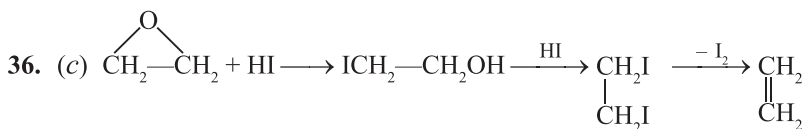
ANSWERS

1. (b) 2. (c) 3. (b) 4. (c) 5. (b)
6. (a) 7. (a) **Or** 8. (d) 9. (a) 10. (b)
11. (c) **Or** 12. (b) **Or** 13. (b) 14. (d)
15. (b) 16. (b)
17. (c) ClF_3 is T-shaped molecule. **Or** 18. (a) 19. (c) **Or** 20. (d)
21. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
- Or**
22. (d) Assertion is wrong statement but reason is correct statement.
23. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
- Or**
24. (b) Assertion and reason both are correct statements but reason is not correct explanation of assertion.
25. (d) Assertion is wrong statement but reason is correct statement.
26. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
27. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
28. (c) Assertion is correct statement but reason is wrong statement.
29. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

30. (c) Assertion is correct statement but reason is wrong statement.
 31. (c) Assertion is correct statement but reason is wrong statement.
 32. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
 33. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
 34. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Or

35. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.



Or

40. (b) Four alcohols and three ethers.
 41. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
 42. (c) Assertion is correct statement but reason is wrong statement.
 43. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
 44. (d) Assertion is wrong statement but reason is correct statement.

Or

45. (c) Assertion is correct statement but reason is wrong statement.